Toxic Shock Syndrome

Section 1: ABOUT THE DISEASE

A. Etiologic Agent

Toxic shock syndrome (TSS) is a serious complication of infection with strains of *Staphylococcus aureus* and *Streptococcus pyogenes* (group A streptococci or GAS) that produce certain toxins (TSS toxin 1 for *S. aureus*, pyrogenic exotoxin A for GAS).

B. Clinical Description

TSS is a severe, toxin-mediated illness characterized by sudden onset of high fever, vomiting, profuse watery diarrhea and myalgia, followed by hypotension and multi-system organ involvement. The systems affected may include the gastrointestinal, muscular, mucocutaneous (including vagina, pharynx, and conjunctivae), renal, hepatic, respiratory, hematologic, and central nervous systems. Severe cases may result in shock and death. A "sunburn like" rash is often present during the acute phase of the illness, with desquamation—especially on the soles and palms—typically occurring 1–2 weeks later. The gastrointestinal symptoms and cutaneous desquamation are more commonly present with *S. aureus*-mediated TSS than GAS-mediated TSS. Pain is a common initial symptom of GAS-mediated TSS, with 80% of patients having clinical signs of soft tissue infection, such as localized swelling and erythema. Both forms of TSS may be associated with invasive infections and can be fatal. TSS may also occur without an identifiable focus of infection. Since TSS can be confused with many infectious and non-infectious causes of fever with mucocutaneous manifestations, diseases such as Rocky Mountain spotted fever, leptospirosis, and measles should be ruled out.

C. Vectors and Reservoirs

Humans are the primary reservoir for both *S. aureus* and GAS.

D. Modes of Transmission

While TSS itself is not communicable from person to person, the organisms that cause TSS are transmissible. Both *S. aureus* and GAS are transmitted from person to person through direct contact with lesions or contaminated respiratory secretions, including droplets. With both *S. aureus* and GAS, transmission involving indirect contact through objects has occurred in schools (contaminated wrestling mats) and in daycare centers (through play food and shared toys). Nose, throat, skin, anal, and vaginal carriers can all serve as sources of GAS infection.

E. Incubation Period

The incubation periods for both *S. aureus*-mediated TSS and GAS-mediated TSS vary from hours to days, depending on the source and the route of infection. For post-operative *S. aureus*-mediated TSS, the incubation period can be as short as 12 hours. For GAS-mediated TSS, the incubation period can be as short as 14 hours after the subcutaneous inoculation of GAS, such as might occur during childbirth or injury.

F. Period of Communicability or Infectious Period

TSS itself is not communicable from person to person, but the bacteria that cause TSS are transmissible. With *S. aureus,* the infectious period lasts as long as lesions drain or the carrier state exists. In untreated, uncomplicated GAS cases, the infectious period may be 10–21 days; if purulent discharges are present, the infectious period may be extended to weeks or months. Persons with untreated GAS pharyngitis may carry and transmit the bacteria for weeks or months, with decreasing contagiousness 2–3 weeks after illness onset.

G. Epidemiology

In 1980, TSS became widely recognized when an association between TSS and the use of tampons was established. Since that time, the proportion of TSS cases associated with menstruation has decreased. Cases of TSS have been associated with childbirth, abortion, vaginal infection, surgical wound infection, focal lesions of the bone or respiratory tract, and cutaneous or subcutaneous lesions. The source of infection is unknown in up to one-third of cases. Cases are seen in both males and females. Persons considered to be at higher risk for *S. aureus*-mediated TSS include: 1) menstruating women using tampons or other inserted vaginal devices (such as diaphragms or contraceptive sponges); 2) persons who have undergone nasal surgery; and 3) persons with post-operative staphylococcal wound infections. People who have chronic cardiac or pulmonary disease, diabetes mellitus, or HIV infection, or persons who inject drugs or abuse alcohol are believed to be at higher risk for GAS-mediated TSS. The incidence of GAS-mediated TSS is also higher in the elderly and in young children, especially those with concomitant varicella infection.

H. Bioterrorist Potential

These pathogens are not considered to be of risk for use in bioterrorism.

Section 2:
REPORTING CRITERIA AND LABORATORY TESTING

A. What to Report to the Massachusetts Department of Public Health (MDPH)

Report a clinically diagnosed case of TSS, as reported by a health care provider.

B. Laboratory Testing Services Available

The MDPH State Laboratory Institute (SLI) does not provide diagnostic testing for TSS. However, the SLI Reference Laboratory will test specimens for the presence of *S. aureus* or GAS, when specimens are submitted as part of an epidemiologic investigation conducted by the MDPH. In some outbreak circumstances, isolates may be sent to the Centers for Disease Control and Prevention (CDC) for toxin testing.

For more information about testing, contact the SLI Reference Laboratory at (617) 983-6607.

Section 3:

REPORTING RESPONSIBILITIES AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify household and other close contacts for possible microbiologic cultures and treatment of bacterial infection.
- To initiate surveillance for concurrent cases of varicella in a school or daycare (for cases of GAS-mediated TSS).
- To identify transmission sources of public health concern (e.g., a health care worker who is a GAS carrier), and to stop transmission from such sources.

B. Laboratory and Health Care Provider Reporting Requirements

TSS is reportable to the local board of health (LBOH). The MDPH requests that health care providers immediately report to the LBOH in the community where the case is diagnosed, all confirmed or suspect cases of TSS, as defined by the reporting criteria in Section 2A.

Laboratories performing examinations on any specimens derived from Massachusetts residents that yield evidence of *S. aureus* or GAS infection (from a normally sterile site) shall report such evidence of infection directly to the MDPH within 24 hours.

C. Local Board of Health (LBOH) Reporting and Follow-Up Responsibilities

Reporting Requirements

MDPH regulations *(105 CMR 300.000)* stipulate that TSS is reportable to the LBOH and that each LBOH must report any confirmed case of TSS or suspect case of TSS, as defined by the reporting criteria in Section 2A. Cases should be reported to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS) using a MDPH *Toxic Shock Syndrome Case Report Form* (found at the end of this chapter). Refer to the *Local Board of Health Timeline* at the end of this manual's *Introduction* section for information on prioritization and timeliness requirements of reporting and case investigation.

Case Investigation

1. It is the responsibility of the LBOH to complete a MDPH *Toxic Shock Syndrome Case Report Form* (found at the end of this chapter) by interviewing the case and others who may be able to provide information. Much of the information required on the form can be obtained from the health care provider or from the medical record.
2. Use the following guidelines to assist in completing the form:
   a. Accurately record the demographic information.
   b. Record clinical information, including date of symptom onset, whether hospitalized (and associated dates), symptoms, blood pressure data, association with the postpartum period (or tampons or a wound infection), hospital name and clinician contact information. Refer to the case definition for TSS in the *Additional Information* section to ensure collection of appropriate laboratory data for help in determining case status. You may ask the health care provider to submit a copy of the medical record to you or enlist his/her aid in completing the clinical and laboratory data sections of the case report form.

c. Include all available diagnostic laboratory information. Attach copies of laboratory results; this will aid the reviewing epidemiologist in determining the case status.

d. If you have made several attempts to obtain case information but have been unsuccessful (e.g., the case or health care provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason(s) why it could not be filled out completely.

3. After completing the form, attach laboratory report(s) and fax or mail (in an envelope marked "Confidential") to ISIS. The confidential fax number is (617) 983-6813. Call ISIS at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

MDPH, Office of Integrated Surveillance and Informatics Services (ISIS)
305 South Street, 5th Floor
Jamaica Plain, MA 02130
Fax: (617) 983-6813

4. Institution of disease control measures is an integral part of case investigation. It is the responsibility of the LBOH to understand, and if necessary, institute the control guidelines listed in Section 4.

Section 4:
CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements *(150 CMR 300.200)*

None.

B. Protection of Contacts of a Case

There are no recommendations for contacts of a case of TSS caused by *S. aureus.*

For TSS caused by GAS, please refer to Section 4B in the chapter entitled *Group A Streptococcus (Invasive)* for recommendations regarding the protection of contacts of a case.

C. Managing Special Situations

Daycares, Schools, Long-Term Care Facilities, and Hospitals

If TSS is caused by GAS in these settings, please refer to Section 4C of the chapter entitled *Group A Streptococcus (Invasive)* for specific recommendations regarding invasive cases of GAS (such as TSS) in daycares, schools, long-term care facilities, and hospitals.

Reported Incidence Is Higher Than Usual/Outbreak Suspected

If the number of reported cases in your city/town is higher than usual or if you suspect an outbreak, investigate to determine the source of infection and the mode of transmission. Seek a common exposure, such as association with a daycare center, and institute applicable preventive or control measures. Control of person-to-person transmission

requires special emphasis on personal and hand hygiene. Consult with the epidemiologist on-call at the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850. The Division can help determine a course of action to prevent further cases and can perform surveillance for cases across town lines, which would otherwise be difficult to identify at the local level.

D. Preventive Measures

Environmental Measures

Advise daycare centers to clean toys daily using an EPA-registered disinfectant safe for use in the daycare setting and to discourage the use of play food, which facilitates the transmission of not only this bacterium but others as well. Also advise schools to sanitize shared sports equipment, such as wrestling and gymnastics mats, frequently.

Personal Preventive Measures/Education

To avoid exposure, advise individuals to:

- Practice good hygiene and frequent handwashing.
- Avoid sharing food, beverages, cigarettes, or eating utensils.
- Receive varicella vaccine, if susceptible to varicella (see the *Chickenpox* and *Shingles* chapter for more information).
- Use the lowest absorbency effective tampon and change frequently. Advise individuals to discontinue tampon use immediately and to call their health care provider if they develop a high fever and vomiting or diarrhea during menstruation.
- Follow directions for use of diaphragms or contraceptive sponges, and do not leave the device in place for more than 30 hours.
- Complete the full course of treatment if prescribed antibiotics for *Staphylococcus* or *Streptococcus* infections.

A Group A Streptococcal Disease Public Health Fact Sheet is available from the MDPH Division of Epidemiology and Immunization or on the MDPH website at www.mass.gov/dph. Click on the "Publications and Statistics" link, and select the "Public Health Fact Sheets" section under "Communicable Disease Control."

ADDITIONAL INFORMATION

The following is the formal CDC surveillance case definition for TSS. It is provided for your information only and should not affect the investigation and reporting of a case that fulfills the criteria in Section 2A of this chapter. (The CDC and the MDPH use the CDC case definitions to maintain uniform standards for national reporting.) For reporting to the MDPH, always use the criteria outlined in Section 2A.

Note: The most up-to-date CDC case definitions are available on the CDC website at www.cdc.gov/epo/dphsi/casedef/case_definitions.htm.

Clinical Case Definition

An illness with the following clinical manifestations:

- Fever: Temperature ≥102.0°F (≥38.9°C).
- Rash: Diffuse macular erythroderma.
- Desquamation: 1–2 weeks after onset of illness, particularly on the palms and soles.
- Hypotension: Systolic blood pressure ≤90 mm Hg for adults or less than fifth percentile by age for children aged ≤16 years; orthostatic drop in diastolic blood pressure ≥15 mm Hg from lying to sitting, orthostatic syncope, or orthostatic dizziness.
- Multisystem involvement (three or more of the following):
  - Gastrointestinal: Vomiting or diarrhea at onset of illness.
  - Muscular: Severe myalgia or creatinine phosphokinase level at least twice the upper limit of normal.
  - Mucous membrane: Vaginal, oropharyngeal, or conjunctival hyperemia.
  - Renal: Blood urea nitrogen or creatinine at least twice the upper limit of normal for laboratory or urinary sediment with pyuria (≥5 leukocytes per high-power field) in the absence of urinary tract infection.
  - Hepatic: Total bilirubin, alanine aminotransferase enzyme, or asparate aminotransferase enzyme levels at least twice the upper limit of normal for laboratory.
  - Hematologic: Platelets <100,000/mm^3.
  - Central nervous system: Disorientation or alterations in consciousness without focal neurologic signs when fever and hypotension are absent.

Laboratory Criteria

- Laboratory results (blood, throat, or cerebrospinal fluid [CSF] cultures) may be positive for either GAS or *S. aureus*. If any other organisms are identified, TSS is ruled out.
- Titers for Rocky Mountain spotted fever, leptospirosis, and measles (if obtained) cannot be rising (four-fold increase in titers).

Case Classification

Probable	A case in which five of the six clinical findings described in the *Clinical Case Definition* section are present.
Confirmed	A case in which all six of the clinical findings described in the *Clinical Case Definition* section are present, including desquamation, unless the patient dies before desquamation occurs.

REFERENCES

American Academy of Pediatrics. [Toxic Shock Syndrome.] In: Pickering L.K., ed. *Red Book: 2003 Report of the Committee on Infectious Diseases, 26th Edition.* Elk Grove Village, IL, American Academy of Pediatrics; 2003: 624–630.

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Heymann, D., ed. *Control of Communicable Diseases Manual, 18th Edition*. Washington, DC, American Public Health Association, 2004.

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FORMS & WORKSHEETS

Toxic Shock Syndrome

Toxic Shock Syndrome

LBOH Action Steps

This form does not need to be submitted to MDPH with the case report form. It is for LBOH use and is meant as a quick-reference guide to toxic shock syndrome (TSS) case investigation activities.

LBOH staff should follow these steps when TSS is suspected or confirmed in the community. For more detailed information, including disease epidemiology, reporting, case investigation, and follow-up, refer to the preceding chapter.

- ❑ Notify MDPH Division of Epidemiology and Immunization, at (617) 983-6800 or (888) 658-2850, to report any confirmed or suspect case(s) of TSS.
- ❑ Obtain laboratory confirmation.
- ❑ Determine if the case attends daycare (for cases caused by Group A *Streptococcus*).
- ❑ Identify other potentially exposed persons.
- ❑ Fill out the case report form (attach laboratory results).
- ❑ Send the completed case report form (with laboratory results) to the MDPH Bureau of Communicable Disease Control, Office of Integrated Surveillance and Informatics Services (ISIS).